

Enhanced Vapor Recovery

October 1, 1999 Workshop

Preliminary Cost Impacts Analysis

California Air Resources Board
California Environmental Protection Agency

www.arb.ca.gov/vapor/evr/evr.htm

Agenda

- Approach
- Cost-Effectiveness
- Business Impacts
- Results
- Future Refinements

Approach

- Standard Cal/EPA Method
- Used in ARB cost analyses
- Also by U.S.EPA and districts
- Provides consistency
- Allows comparisons with existing and proposed regulations

Approach (cont.)

■ Evaluate Incremental Cost Increases

- Costs with and without the proposed new requirements
- Difference = incremental cost increase

Approach (cont.)

■ 2 Main Elements

– Cost-Effectiveness

- Dollar per pound pollutant reduced
- For comparison with other regulations

– Business Impacts

- Typical business costs
 - 10% change in profitability => significant
- Impacts on employment, competitiveness, expansion
- Impacts on consumer
- Impacts on local or State agencies

Cost-Effectiveness Analysis (\$/lb)

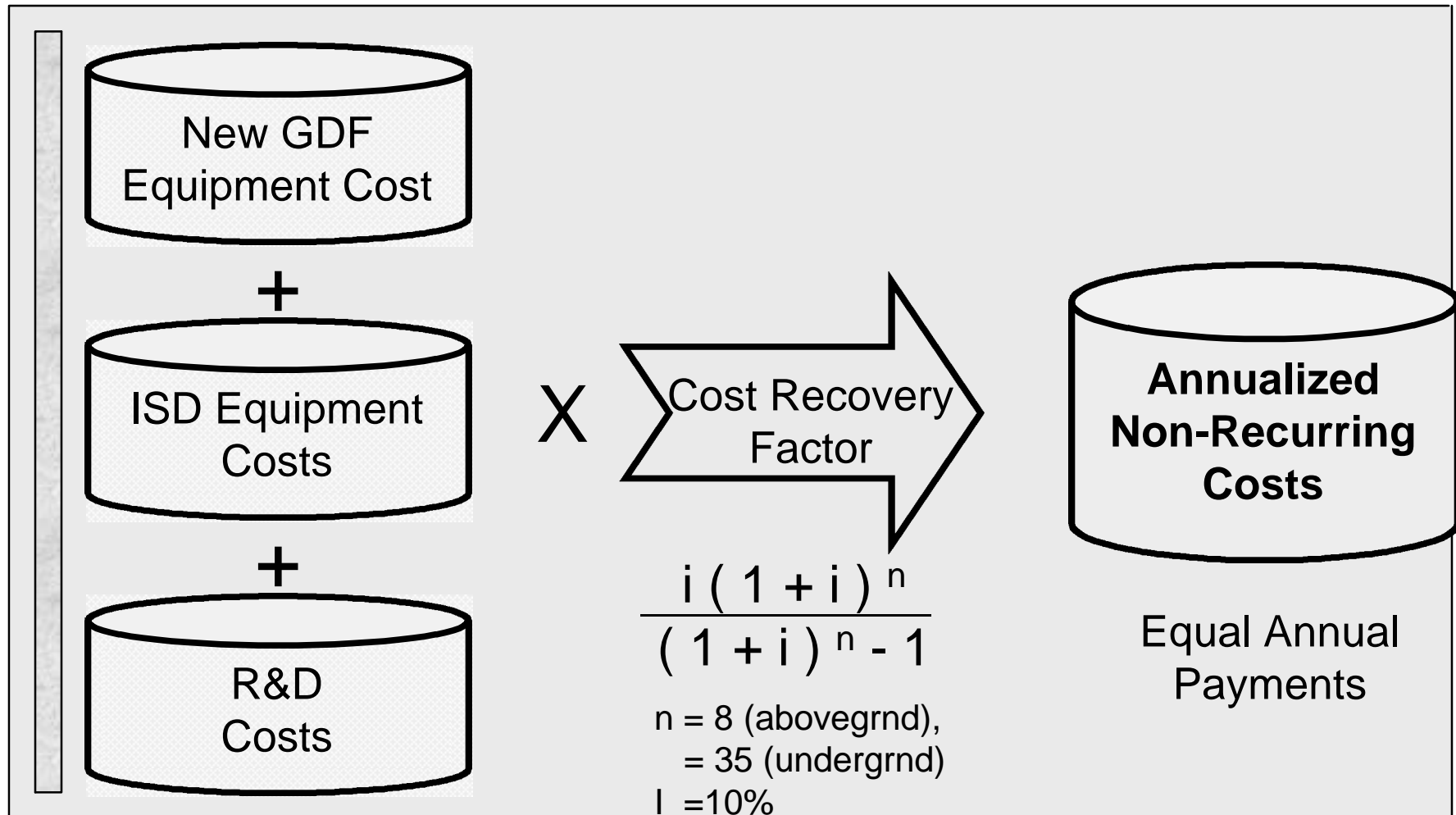
Annualized
Non-Recurring
Costs, \$/yr

+

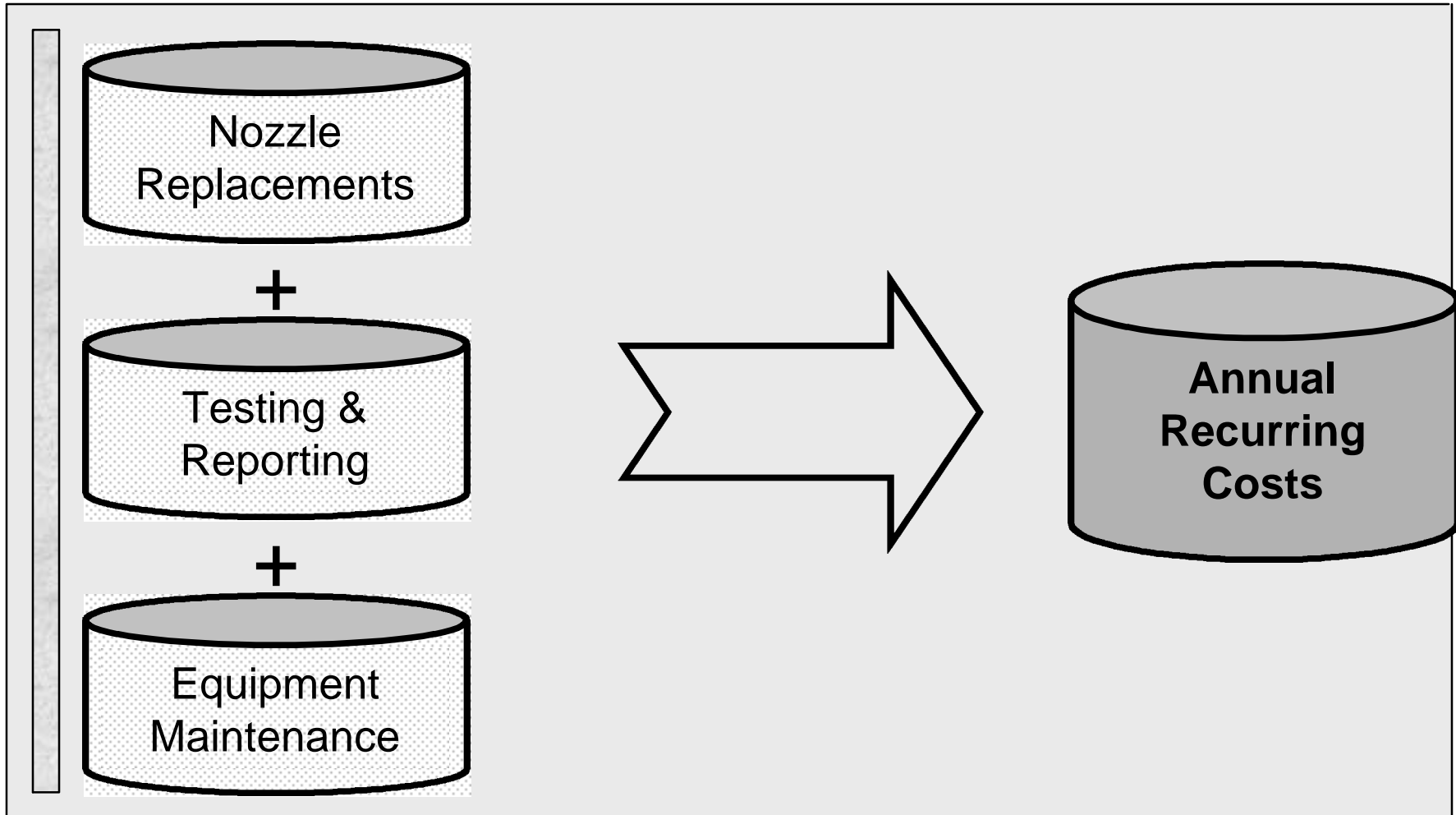
Annual
Recurring
Costs, \$/yr

**Annual Emission
Reductions, lb/yr**

Annualized Non-Recurring Costs



Annual Recurring Costs



Model Plant Configurations

- Numerous possible GDF configurations
 - “uni-hose” v. multidispensers
 - low to high throughput
 - balance v. assist
- Model Plant approach used by USEPA
- Total GDFs in CA
 - 11,250 (WSPA, 1999)
 - 7,077 (CA Dept. of Commerce, 1999)

Model Plant Configurations (cont.)

Model Plant	1	2	3	4	5
KGal/Month	0-10	10-25	25-50	50-100	100+
%CA Facilities	8.3%	15%	23.5%	32.3%	20.6%
#Dispensers	2	3	6	9	12
#Nozzles (wtd-avg)	2.5	3.25	6.5	9.75	16.25

- Model Plants 1 and 2 assumed primarily balance systems
- Model Plants 4 and 5 assumed primarily assist systems
- Model Plant 3 assumed hybrid balance & assist systems

Model Plant Configurations (cont.)

[Non-Recurring Costs, \$/GDF in 1999\$]

Model Plant	1	2	3	4	5
Dispensers	\$1,687	2,194	4,388	5,077	8,465
Auxiliary	0	0	0	5,634	5,634
Piping	4,206	5,324	8,304	9,831	12,455
ISD	1,756	1,991	2,695	3,400	4,104
R&D	1,148	1,148	1,148	1,148	1,148
Certification	667	667	667	667	667

Model Plant Configurations (cont.)

[Recurring Costs, \$/year-GDF in 1999\$]

Model Plant	1	2	3	4	5
Maintenance	0	0	0	0	0
Gas Recovery	-72	-167	-186	-251	-1,121

Statewide Emission Reductions (preliminary estimates)

EVR Program Element	CA Reductions, TPD
Phase I to 98% efficiency	4.00
Phase II	
■ vapor displacement	6.88
■ liquid retention	4.02
■ pressure-related fugitives	21.2
ISD (Low A/L ratios)	5.93

EVR Cost-Effectiveness (preliminary estimates)

EVR Program Element	Cost-Effectiveness, \$/lb VOC reduced
Phase I to 98% efficiency	\$0.40
Phase II	
■ vapor displacement	\$2.00
■ liquid retention	\$2.00
■ pressure-related fugitives	\$2.00
ISD (Low A/L ratios)	\$1.20

Cost Effectiveness of Recent ARB Regulations

ARB Regulation	Cost-Effectiveness \$/lb Reduction
Proposed EVR (as of 9/27/99)	\$1.60
Consumer Products Mid-term 2(10/99)*	\$6.30
Consumer Products Mid-term 1 (7/97)*	\$7.10
On-Road Motorcycles (12/98)**	\$5.60
Small Off-Road Engines (3/98)**	\$9.63
Marine Engines and Personal Watercraft (12/98)**	\$3.57

* per pound of VOC or HC, ** per pound of HC+NOx

Future Refinements

- Phase I costs to 98% efficiency
 - assumed \$500 purchase+installation per GDF for improved coupling
- Phase II costs:
 - R&D, Certification Testing
 - ISD, “uni-hose”
 - Maintenance costs (current v. proposal)
 - GDF distribution

Conclusions

- Proposal is cost-effective overall (\$1.20-\$2.00, overall \$1.60/lb)
- Future refinements to:
 - Costs (R&D, ISD, annual maintenance, certification testing, “uni-hose”)
 - Model plant distribution in CA